The State of the Central Wisconsin River Basin

Public Review Draft

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A six-year plan to protect and enhance our aquatic and terrestrial resources

A Report by the Wisconsin Department of Natural Resources in Cooperation with the Central Wisconsin Partners

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To interested parties of the Central Wisconsin River Basin:

On behalf of the Central Wisconsin Basin Partnership Team and the Central Wisconsin Basin Water and Land Team supervisors and staff, we are pleased to present the Central Wisconsin River Basin Integrated Management Plan. We hope the objectives and recommendations contained in this document will provide direction for future project preparation within the Wisconsin Department of Natural Resources and will guide initiatives undertaken by the Partnership Team.

This was truly and integrated effort and has resulted in integrated objectives. Successful completion of these objectives can only be achieved through cooperation between programs within the Department of Natural Resources and with stakeholders outside the Department. We thank the members of the Partnership Team for valuable comment in the development of this plan.

Look for more information at the WDNR's Central Wisconsin River Basin website: http://www.dnr.state.wi.us/upwiscen/index.htm .

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Executive Summary

The Central Wisconsin River Basin Plan provides a summary of the existing water and some terrestrial resources in the Central Wisconsin River Basin. The Basin Plan also includes some recommendations for maintaining and improving the quality of these aquatic ecosystems. The Department of Natural Resources staff will obtain guidance and direction from the basin plan. A description of the water programs within the Department of Natural Resources can be found in Chapter Two. The Basin Plan was not intended to cover the specific directions for every water program and function. Rather, the recommendations and priorities are intended to address the major concerns for the water program staff to use in an integrated approach. We also recognize that the Department of Natural Resources cannot accomplish any of this work without the cooperation of the many partners and agencies whom share our interest in maintaining and improving the aquatic ecosystems. Any recommendations for our partners should be consider strictly advisory as we recognize that they have their own mandated work and priorities.

The Central Wisconsin River Basin is divided into 29 different watersheds. A narrative of all 29 watersheds, including watershed recommendations, is found in detail in Chapter Three. Surface waters comprise 3.3 percent of the entire basins surface area, with over 2,873 miles of streams and rivers. The Wisconsin River in the Central Wisconsin River Basin is made up of over 53,898 acres, 13 flowages and 15 dams. Numerous wastewater treatment plants discharge to steams and rivers in the basin, including the Wisconsin River. Descriptions of those discharges can be found in the watershed narratives. Much of the groundwater and surface water in the Central Wisconsin basin has the potential to be impacted in one way or another by poor land-use. A more detailed description of the basin characteristics can be found in Chapter One along with a list of natural resource priorities unique to this basin.

The Central Wisconsin Basin Partnership Team, is a diverse interest group that was created to discuss current problems that face our basin. The partnership team is made up of an assortment of agencies, organizations, and private citizens that provide increased awareness of regionally important natural resources issues. The partnership facilitates and implements projects that promote ecologically, socially, and economically sustainable natural resource management. Currently the partnership is working on adding new working groups that will lend support to local units of government and organizations throughout the basin. A more detailed description of the partnership can be found in Chapter Four.

Introduction

The Central Wisconsin Basin is a subset of the entire Wisconsin River corridor, located in Central Wisconsin. The Central Wisconsin Basin extends south from the Merrill dam located on the Wisconsin River in Lincoln County to the Castle Rock Flowage Dam in Juneau and Adams Counties. The Wisconsin River is divided into three segments distributing the workload equally between different WDNR regions and offices. The basin is 4,021 square miles with an approximate population of 301,599 (+/- 1%).

The Central Wisconsin River Basin is divided into 29 different watersheds. A watershed is an area of land that is drained by a waterway that flows to a lake, reservoir or river. The watershed boundary line is defined as a topographic dividing line from which surface streams flow in two different directions.

The Central Wisconsin River Basin contains numerous scenic vistas as a result of rock outcroppings and beautiful flowages. This basin is characterized by agricultural activities throughout the basin with intensive row cropping taking place in the central sands region. The last glaciers to flatten Wisconsin only stretched through part of the basin. The glaciers created a network of warm and cold water streams fed by surface and groundwater sources that all connect to the Wisconsin River. The Central Wisconsin River Basin has one of the largest and most diverse arrays of surface water systems in the state. In fact, the Central Wisconsin River basin contains over 2,873 miles of streams. Portions of Adams, Clark, Jackson, Juneau, Langlade, Lincoln, Marathon, Marquette, Portage, Shawano, Taylor, Waushara and Wood Counties partially or fully lie within the Central Wisconsin Basin.

The following chapters describe the basin in detail, including the historical and existing conditions of the land and water resources. The report ends with recommendations on how the Wisconsin DNR and basin partners can address the issues and threats to the land and water resources of the Central Wisconsin River Basin.

The 1991 Water Quality Management Plan

The Central Wisconsin River Water Quality Management Plan, written in 1991 and 1992, has been the basis for water resources management priorities and activities focusing on water quality issues of the Central Wisconsin River basin. It evaluate the controls that regulate the amount of polluted runoff coming from point sources and provides management and monitoring recommendations for lakes and streams.

The Water Quality Management Plan includes detailed discussions of each of the 29 watersheds within the Central Wisconsin River basin, along with basin-wide recommendations. These components of the 1991, 1992 Water Quality Management Plan will continue to be used as a basis for management decisions. As discussions and recommendations are made for the watershed they will supersede the existing 1991, 1992 Water Quality Management Plan. The State of the Basin Report contains the most up-to-date lake and stream tables superseding the tables found in the 1991, 1992 Water Quality Management Plan.

Purpose of the State of the Basin Report

The Wisconsin Department of Natural Resources has produced the State of the Central Wisconsin River Basin Plan, which describes the condition, issues and threats to the land and water resources of the basin. The issues and threats that face the natural resources of this basin are in some ways unique, but in other ways also reflect general statewide trends. Due to jurisdiction, workload issues, and a variety of other constraints, the Wisconsin DNR staff cannot completely address every issue facing the natural resources of this basin. Thus, the State of the Central Wisconsin Basin Plan is organized by issues affecting water quality and quantity and has recommendations that are focusing on individual watersheds and basin wide.

Four reasons for the purpose of the State of the Central Wisconsin River Basin Report are listed below:

1) Provide the people of Wisconsin with the state of the natural resources in the Central Wisconsin Basin.

2) Discuss and prioritize issues facing the natural resources of the basin for the Central Wisconsin River Basin Team to address over the ensuing six years.

3) Provide the status of waterbodies in the basin to the U.S. Environmental Protection Agency for use in reports to determine funding levels the Wisconsin DNR receives under the Clean Water Act.

4) Report to the U. S. Federal government the purpose and use of grant money received by the Wisconsin DNR from the U. S. Fish and Wildlife Service.

Bedrock Geology

The Central Wisconsin Basin lies on the south edge of the Wisconsin dome. The Wisconsin Dome is a regional structure in Precambrian igneous and metamorphic bedrock. In the case of the Central Wisconsin Basin the dip of the Precambrian surface is primarily to the south.

Precambrian igneous and metamorphic bedrock is the uppermost bedrock in Lincoln County, Marathon County, and the northeastern one-third of Wood County and the northern half of Portage County.

Cambrian sandstone overlies Precambrian rock in Juneau, Adams, Waushara the southern half of Portage and much of the southwest two-thirds of Wood Counties. Sandstone becomes progressively thicker in a southerly direction. The maximum depth of sandstone in southern Adams County exceeds 500 feet[1].

Glacial Geology

The Lincoln County portion of the Central Wisconsin Basin, the western seven-eighths of Marathon County and two-thirds of Wood County are covered with glacially deposited material of the Lincoln and Marathon Formations which were deposited by earlier pre-Wisconsin glaciers[2].

Glacial outwash is present in the river valleys of Marathon, and Wood Counties as well as on the sand plains of southeast Wood, northwest Waushara, western Portage and eastern Adams Counties[3].

Lacustrine deposits of glacial Lake Wisconsin are the present in western Adams, the northeast three-quarters of Juneau and the southern portion of Wood Counties[3].

The terminal moraine and some ice-contact and pitted outwash deposits from the Green Bay Lobe of the Wisconsin Glacier are present within the Central Wisconsin Basin in eastern Marathon, central Portage and northwest Waushara Counties. The terminal moraine of the Green Bay Lobe forms the divide between the Central Wisconsin and Upper Fox basins in eastern Adams County[3].

Groundwater

Precambrian igneous and metamorphic rocks in this area are for the most part non-aquifers. Exceptions include fracture zones and limited areas of highly weathered “rotten granite”.

Many of the glacial tills in the northern portion of the basin yield little water due to their high silt and clay content.

Sand and gravel aquifers in the stream valleys can provide ample quantities of water to wells in the northern portion of the basin.

Sandstone and unconsolidated aquifers become thicker the further south one is in the basin. The increased thickness of the aquifer material allows substantial yields from wells. This capacity is reflected in the number of high capacity wells serving center-pivot agricultural irrigation wells in Portage and Adams Counties.

Groundwater provides drinking water to all citizens of the basin. This precious resource is at risk simply due to the highly permeable sand and gravel soil found in the basin. Sand and gravel act as a good filter,

but due to the shallow water table and how quickly the surface water is able to reach the groundwater, very little filtering is able to take place. Knowing this risk is pervasive throughout the basin, residents, business and municipalities must take great care in disposing of wastes that could potentially contaminate their drinking water supply.

The University of Wisconsin-Stevens Point conducted well sampling for triazine, an agricultural chemical that is used to eliminate and control weeds in corn crops. Triazine is a component of the parent compound atrazine. Triazine is used in testing for atrazine because it is relatively inexpensive and a simple test to conduct. Atrazine is a possible human carcinogen, that if found in drinking water in quantities over three parts per billion, can be harmful for human consumption. Since triazine is only an indicator of atrazine in the groundwater, the values of triazine can only be interpreted as a probability that the sample exceeds the Wisconsin groundwater enforcement standard (ES) for atrazine. For example if the value for triazine in a well was reported as 1.5 parts per billion, there is a 50% probability that the total atrazine residue will exceed the ES limit of three parts per billion.

Surface waters

Overall, the Wisconsin River Basin has 85,132 acres of surface waters including both streams, rivers and lakes, which comprises 3.33% of the entire basin surface area. The basin is comprised of 53,898 acres of Wisconsin River and its flowages, 24,886 acres of other named waterbodies, 1,475 acres of unnamed lakes with Water Body Identification Codes (WBIC). Out of 2,873 miles of stream in this basin, not including Wisconsin River, 590 miles are classified as warm water sport fisheries (WWSF), 653 miles are classified as cold water streams. The remaining stream miles are either classified as warm water forage fish (WWFF), limit forage fish (LFF), Limited Aquatic Life (LAF) or unknown.

The Central Wisconsin Basin contains several cold water streams, many of which are in good condition, but others are threatened by urban and agricultural non-point source pollution and excessive water withdrawals from municipal and industrial wells. Stormwater runoff from urban areas, barnyard runoff and inadequate sod cover on streambanks tops the list of problems. An extensive effort to restore in-stream habitat for trout and the purchase of streambank easements for fishing access has been somewhat successful in the Central Wisconsin River Basin.

Brief History

In 1787 Wisconsin was included in "The Northwest Territory". During this time period extensive cutting of timber along the Wisconsin River was approved by the War Department through a treaty with the Menomonee Indians. The treaty read that the United States owned a strip of land three miles wide on each side of the Wisconsin River and 40 miles long, this strip of land is now the upper portion of the Central Wisconsin River Basin. The first saw mill was built on the Wisconsin River in a city formally called Whitney Rapids (City of Wisconsin Rapids) in Wood County.

Since the Wisconsin River was used to float saw logs to the sawmills along the Wisconsin River, a constant flow of water was required to make this operation successful. An organization called the Wisconsin Valley Improvement Company was organized by the sawmill owners on the river to keep the Wisconsin River at a usable flow, even during low flow periods. This company owns and controls a number of reservoirs at the headwaters of the Wisconsin River. Their purpose is to store the accumulation of water during runoff events and release water to supplement Wisconsin River flows when needed.

The Big Eau Pleine Reservoir, the last reservoir built, was constructed by the Consolidated Water Power and Paper Company in 1936.This reservoir is located about one mile from its confluence with the Wisconsin River and about twenty miles from Stevens Point. It is about thirteen miles long by two miles wide and impounds over four million cubic feet of water. The dam is one and a quarter mile wide and over thirty feet high with three floodgates and one gate for excess flow.

The first bridge over the Wisconsin River was a toll bridge built by the Wood County Bridge Company located between Grand Rapids and Centralia Dam. Today the same bridge is located in downtown Wisconsin Rapids.

While Wisconsin was becoming a state, saw mills began springing up along the riverbanks of central Wisconsin. As the forests along the Wisconsin River started to disappear, so did the towns and sawmills. A network of railroads provided easy access for passengers and products to move about the state. As the logging industry declined, papermaking replaced saw mills as the number one provider of jobs in Central Wisconsin.

Central Wisconsin is not only a major producer of paper and dairy products but is the largest producer of red potatoes in the United States. It is the third largest in terms of overall potato production, behind Washington and Idaho.

When pine trees were all harvested, the loggers converted to farmers. Central Wisconsin's long growing season, abundant water, and long days were perfect for farming. By the turn of the century, the remaining thin layers of organic topsoil were gone leaving only a sandy plain. The soil was infertile and easily eroded, and water quickly leached through to the high water table just a few feet below.

By 1916, Wisconsin farmers had begun using innovative farming techniques to control erosion and increase soil fertility, which improved their yields. In 1947, the first irrigation system was installed and russet potato yields tripled. Today the once infertile area now known as the "Golden Sands" annually yields millions of dollars worth of potatoes, snap beans, corn, and cranberries.

The Department of Natural Resources in the early 1990's defined the Central Wisconsin River Basin as the area located between the Castle Rock Dam and Merrill Dam. The original Central Wisconsin River Basin Plan was created in 1992 and is now currently updated for the year 2002. The report incorporates all the data and information that was gathered in our basin before and after 1992. This plan, along with the previous plan, is used to determine work priorities and where more data and research is needed throughout the basin.

The Central Wisconsin River Basin Today

Overall distribution of land throughout the Central Wisconsin Basin is 2% urban development (residential/industrial/commercial), 46% agricultural, 39% forest, 10% wetland, and 3% other. The majority of the agriculture found throughout the basin is slowing starting to shift from single family farms to farming corporations. With a large part of the basin being used for vegetable, milk and beef production, land use management plans need to be written and followed to ensure the quantity and quality of ground and surface waters for the future.

The Central Wisconsin Basin has vast wetland complexes that are protected either by private and public local ownership. Examples of publicly owned wetlands include the Mead Wildlife Area, Dewey Marsh State Wildlife Area, Wood County State Wildlife Area, and The Necedah National Wildlife Refuge. The Army Corps of Engineers and the DNR have the authority to regulate all the wetlands in Wisconsin. Wetlands provide many benefits including filtration of excess nutrients and pollutants, habitat for fish and wildlife, storage of floodwaters, and enjoyment for education and recreation.

Population Changes

The current population of the Central Wisconsin Basin is 301,599 (+/- 1%). The population is predicted to increase 3.8% to 313,155 by the year 2015. The Central Wisconsin Basin is one of the largest in area, however it is only ranked sixth over all in total population compared to the 24 major hydrologic basins located in Wisconsin.

Ecological Landscapes of the Central Wisconsin Basin

There are two Ecosystem regions in the Central Wisconsin Basin, the Farm-Forest Transition and the Central Sand Plains.

The Farm-Forest Transition ecological region is located in the upper half of the basin beginning at the edge of the Little Eau Claire River Watershed (UW14) and continuing to the Mississippi River to the west. This zone is defined as a mix of forest, agriculture, and swamp in the transition zone between northern forests

and central hardwoods. Unlike the eastern portion of the region, small kettle lakes are common throughout the moraines in the western section. Creeks and rivers flow across the plain including the Big Rib, Little Rib, Trappe and Wisconsin creating a dendritic drainage system. Soils are poorly to well drained and range from sandy loam to loam and shallow silt loam. Vegetation is mainly northern hardwood forest dominated by sugar maple and hemlock with some yellow birch, red pine and white pine. There are small areas of conifer swamps near the headwaters of streams. Major land uses include agriculture and forestry with some ginseng production. Agriculture is dominated by dairy farming, row crops and grazing. Forestry is the dominant land use on the eastern region of the Farm-Forest Transition.

The Central Sand Plain makes up the southern part of the basin and only carries over into southern Clark and eastern Jackson Counties. Its sandy soils and sandstone buttes formed by glacial actives define the Central Sand Plains. The Wisconsin River is the largest river and no large naturally occurring lakes are found in this region. Soils are comprised of sand, loamy sand, sandy loam, silt loam, muck, peat and small amounts of clay. The northwest Central Sand Plains supports a mesic forest with some hemlock and white pine. Wetlands, oak-forest and pine-oak barrens are found throughout the entire region. The primary land uses are forestry (pine plantation and pulp production), agriculture with the use of center-pivot irrigation and some cranberry production. In addition to these land uses, there is also a significant amount of marginal, idle agricultural land and a high percentage of publicly owned lands.

There are several ecological management opportunities that were recommend by the Wisconsin Department of Natural Resources Land Ecosystem Management Planning Team for the Central Sand Plains and Farm-Forest Transition Regions. Several of the recommendations include restoration of the northern hardwood forests, large-scale barrens, wetlands and grasslands. Other recommendations incorporated management tactics for increasing populations of the Karner Blue Butterfly, Massasuga rattlesnake, Blanding's turtle, rare herptiles, and large mammals. Preservation of the sandstone buttes and cliffs along with upland conifer forests of jack, red and white pine were also highly recommended (DNR 2000, Ecological Landscapes of Wisconsin).

Basin Wide Priorities

The Basin Wide Priorities are an attempt to identify water quality initiatives and management objectives for the Central Wisconsin River Basin. These initiatives are focused on problems of regional significance as opposed to the watershed recommendations found in each of the watershed chapters. Improvements in surface water quality have taken place throughout the state of Wisconsin since the Clean Water Act in 1974. Many priorities from the last state of the Basin Plan have been implemented or accomplished. All the priorities below require a comprehensive management approach within the DNR and with other agencies and public and private groups. Some priorities are purely advisory, while state statues and codes mandate conformance to others. The Department of Natural Resources encourages the implementation of these priorities through interagency cooperative agreements, voluntary cost-share programs, public participation programs and information and education programs. This list of priorities was complied by the entire Central Wisconsin Basin Water Program Staff. The list is not provided in rank order.

1. Monitor and comprehensively study the Wisconsin River and its tributaries for water quality. The information generated would be used to make management decisions, which would ultimately solve many water quality issues.

2. Department staff should oppose construction of dams and encourage removal of existing dams on basin streams.

3. Continue to monitor groundwater and surface water consumptive uses and their impacts on surface aquatic life and groundwater level sustainability. Where possible regulate the withdrawals of both surface and groundwater to protect water dependent natural resources. Where regulations are not adequate, work with local communities to reduce impacts. Encourage conservation measures to minimize these impacts.

4. Evaluate impacts to water quality from NonMetallic Mining through permit compliance monitoring in Central WI.

5. Watershed Staff should continue monitoring surface waters to support the 303 (b) report and identify impaired waterbodies for the 303 (d) list.

6. Continue trout habitat improvements and maintenance on state owned and easement properties.

7. Continue to protect sensitive or critical shoreland habitats through easements or acquisition.

8. Continue to monitor and address contaminants of concern basin-wide in surface water, sediment, groundwater, fish, and other water dependent resources.

9. The Drinking and Groundwater staff along with Watershed staff and our partners should continue to collect information, water samples, etc. to document the non-point contamination of Central Sands and other aquifers in the basin. This information should be used to develop educational and regulatory strategies to address the source of the contamination.

10. Watershed staff should continue efforts to reduce agricultural NPS inputs into waters of the state.

11. Basin Staff should continue to work with stakeholders to identify and designate sensitive habitat areas.

12. Encourage municipal water systems to adopt comprehensive Well Head Protection Plans.

13. Encourage Best Management Practices in all agricultural areas designated as vulnerable to groundwater contamination.

14. Encourage NRCS to extend their funding program that offers financial assistance to farmers for abandonment of unused wells on agricultural properties.

15. Encourage municipal water systems to reduce water losses in their distribution systems and expand water conservation measures by their customers.

16. Basin staff shall continue to monitor aquatic and terrestrial exotics, document the distribution, and work with partners to prioritize control efforts to minimize the spread of exotic species on state lands and waters within Central Wisconsin River Basin.

17. Basin staff shall continue to monitor aquatic and terrestrial communities, and document the distribution and status of endangered, threatened, special concern species and natural communities within the Central Wisconsin River Basin.

18. Basin Staff should continue to identify and pursue the abandonment of noncomplying water supply wells that serve as conduits for contamination of groundwater.

19. Continue to work with local government departments such as health departments and zoning departments; private sector businesses; and professional associations e.g. Well Drillers, WI. Water Well Assoc. (WWWA), WI. Rural Water Assoc. (WRWA), Wisconsin Wastewater Operators Association (WWOA), Wisconsin Association of Zoning Administrators, etc. on educational programs and materials addressed to the general public/farmers concerning the protection of all waters of our basin.

Water Resource Management Programs

Department of Natural Resources Created

The legislature created the Department of Natural Resources in 1967, allowing a comprehensive approach to managing complex environmental problems. Conservation, recreation, wastewater and drinking water protection functions were merged under one agency, allowing staff to apply more cohesive, thorough strategies to reduce air pollution and hazardous wastes, protect groundwater, provide drinking water, encourage waste reduction and recycling, protect non-game and endangered species, and acquire lands for public use.

The Department of Natural Resources Today

The reorganization of the Department of Natural Resources in 1996 accomplished a restructuring of the agency to optimize efficiency and effectiveness, and improve integration of DNR programs to better serve customers and environmental protection. Residents of the state have input into the agency through basin partner teams, to set local priorities for natural resources management.

Want to know more?
http://www.dnr.state.wi.us/org/caer/ce/news/on/on991220.htm
http://www.wnrmag.com/supps/1997/dec97/dec97.htm

The DNR Mission Statement:

The Mission of the Wisconsin Department of Natural Resources is to protect and enhance our natural resources, our air, land and water; our wildlife, fish and forests and the ecosystems that sustain all life. To provide a healthy, sustainable environment and a full range of outdoor opportunities. To ensure the right of all people to use and enjoy these resources in their work and leisure. To work with people to understand each other's views and to carry out the public will. And in this partnership consider the future and generations to follow.

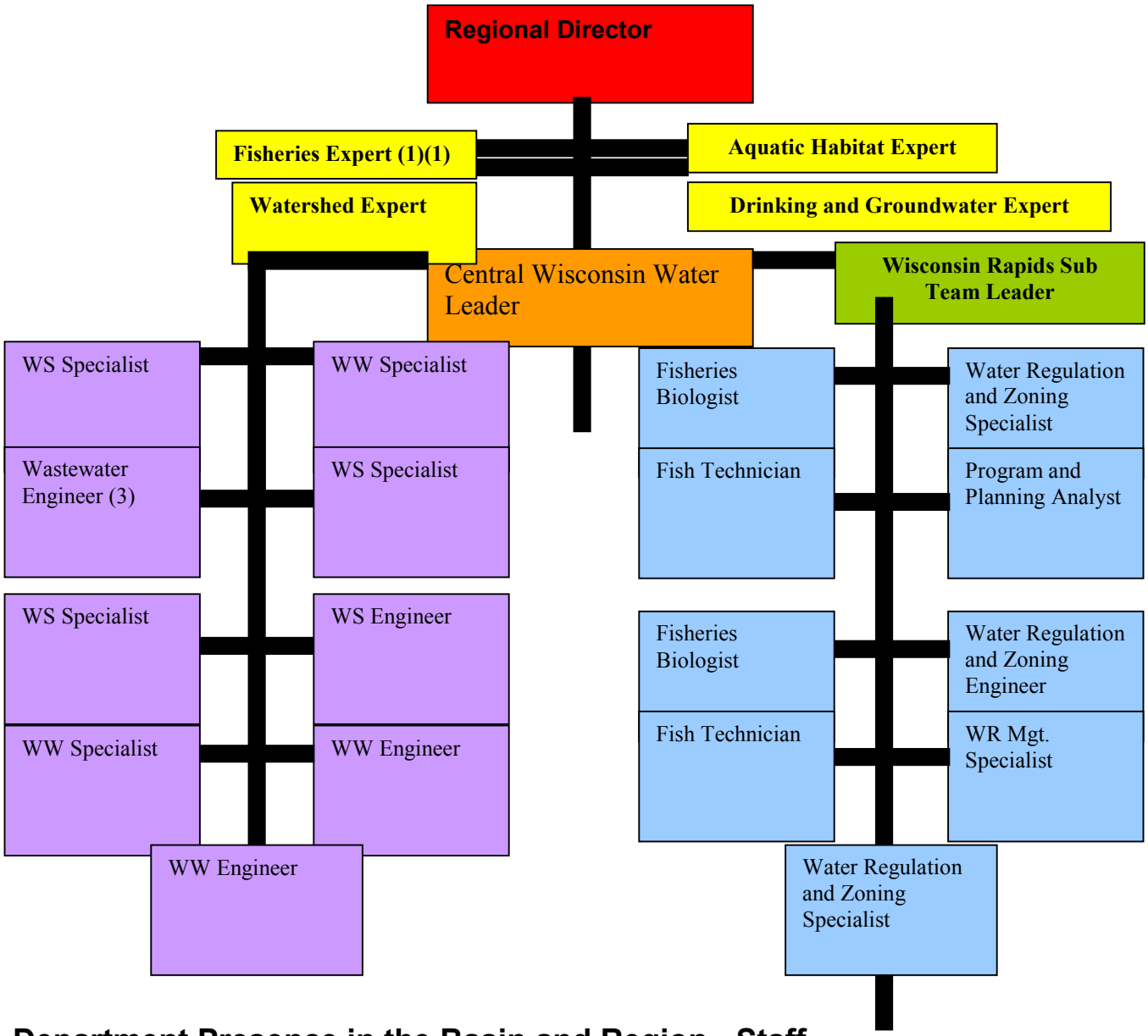
Want to know more?
http://www.dnr.state.wi.us/aboutdnr/missionstatement.html

A strategic plan for the agency was recently adopted. It emphasizes ecosystem management, increasing reliance on partnerships to accomplish natural resources goals, protecting public health and safety, and providing for outdoor recreational opportunities today and in the future.
The Strategic Vision states:

> *We share responsibility as natural resources stewards with Wisconsin's citizens, government, businesses and visitors. We recognize that air, land and water are interconnected in sustaining all life, in protecting public health and in achieving healthy ecosystems and the sustainable economies that depend on these ecosystems. We recognize that forestry, farming and nature-based recreation – like hunting, fishing and trapping – are key to the state's economy and quality of life. We value our dedicated staff and provide them with the tools and training needed to ensure that Wisconsin has the best-managed natural resources in the world.*

The Department of Natural Resource's duties today reflect the laws Wisconsin citizens sought over decades to protect the state's natural resources while allowing the economy to flourish. The Department balances conflicting uses today so quality natural resources are available tomorrow. The Department's authority comes from decisions of the Legislature, Governor's office, the Natural Resources Board and the courts. Tax revenue and user fees support DNR programs.

Figure 2-1. DNR Water Program Staff Working Primarily in the Central Wisconsin Basin.



Department Presence in the Basin and Region - Staff

About half of the Central Wisconsin River Basin staff is located in Wisconsin Rapids area, and the remainder is in located in Wausau. The majority of the permanent employees in the Water Programs have part or all of their job responsibilities within the Central Wisconsin River Basin. Of these, approximately 25 people work primarily within the Central Wisconsin River Basin.

Of the 25 Water Program staff members, 4 staff member's work throughout the entire West Central Region

Fisheries and Aquatic Habitat Programs

Want to know more about rivers and streams?
http://www.dnr.state.wi.us/org/water/fhp/
http://www.dnr.state.wi.us/org/water/fhp/rivers/index.htm

Habitat Protection and Fisheries Management Programs protect, improve and manage Wisconsin's sport, commercial and non-game fisheries and aquatic habitats for the benefit of the citizens of Wisconsin. Fisheries biologists and technicians in the basin work with other resource specialists, government agencies and conservation organizations to plan projects that protect, restore, and enhance fisheries and habitat. Farmers, landowners, angling groups, lake associations and others cooperate with fisheries personnel to reduce bank erosion, improve trout habitat, restore riverine environments through dam removal, and restore near shore and offshore fish habitat.

Each year WDNR fisheries biologists work closely with anglers and the commercial fishing industry to devise new fisheries regulations in response to fish population changes. Providing people with fishery and habitat information and providing other educational opportunities is an integral part of connecting people with the environment. Fisheries biologists team up with teachers and conservation organizations to loan equipment and introduce environmental and angling educational opportunities to the students and the public.

Rivers and Streams Planning and Protection Grant Program

In 1999, the legislature established the Rivers and Streams Planning and Protection Grant Program. Local units of government, qualified river management associations and non-profit conservation organizations can apply for state grant funds for planning, protection and restoration activities on rivers and streams. The Rivers Program assists local organizations by providing information on riverine ecosystems, improving river assessment and planning, and increasing local understanding of the causes of river problems. Activities that may receive funding include conservation easements, land acquisition, local regulations and ordinance development, pollution control practices, stream or shoreland habitat restoration, educational and monitoring activities. The new Rivers Program is an excellent opportunity for qualified groups to get assistance in helping to protect, preserve or restore river and stream systems.

The Lake Management Program

Want to know more about lakes?
http://www.dnr.state.wi.us/org/water/fhp/
http://www.wnrmag.com/stories/2000/apr00/shore.htm

Was developed to help protect and maintain Wisconsin's 15,000 inland lakes to provide a full complement of lake uses for all citizens. The Program cooperates with the University of Wisconsin - Extension, local units of government, Lake Districts and associations, and lake-specific conservation and community groups. It helps coordinate action of the many WDNR programs that affect lakes. A major goal is ensuring that an adequate water quality database exists to support current and future management programs.

Wisconsin Lakes Partnership Program

The Wisconsin Lakes Partnership Program helps ensure healthy and diverse lake ecosystems while considering the society needs. Three groups form the core of this team. The Department of Natural Resources supplies technical and financial assistance and regulatory authority. The University of Wisconsin Extension builds linkages between stakeholders and provides educational materials and programs. Lake Organizations, property owners, and local governments provide the political will and hard work to accomplish watershed restoration and lake protection projects. Together, these three groups cooperate in lake planning and protection activities. The Wisconsin Association of Lakes (WAL) provides a united voice for Lake Organizations around the state. WAL plays a vital role in all areas of the lake partnership, providing support to strengthen local lake leadership, deliver education and promote public policy.

EPA Clean Lake Grant Program

The Lakes Management Program acts as liaison with the U.S. Environmental Protection Agency (EPA) for the federal Clean Lake Grant Program. Cost-sharing grants support the planning and implementation of lake protection and restoration projects. The awards are competitive and typically for 50 percent of the cost of the entire project. Phase I grants cover diagnostic and feasibility studies while Phase II grants cover implementation work. While Regional Water Team staffs apply to the EPA for grants on behalf of local project sponsors each year, and help administer successful grants.

Lake Planning and Protection Grants (NR 119 and NR 191)

Lake districts, lake associations, tribes, counties, cities, villages, or towns can apply for *Lake Planning Grants* to fund the collection of information on the quality of water in lakes, delineation of watershed boundaries, land use inventories, or studies of local zoning and shoreland regulations. Projects chosen may be awarded up to $10,000 with a 25 percent local cost share. Lake Protection Grants fund implementation of lake protection and restoration projects. *Lake Protection Grants* provide 50 percent state cost-sharing assistance, up to $100,000. Eligible projects include land acquisition, wetland restoration and local ordinance development to prevent lake ecosystem or water quality degradation.

Monitoring Programs

Statewide, 50 lakes are monitored intensively to evaluate long-term trends in lake water quality. Monitoring includes biological and physical conditions and water chemistry. Aquatic plants, fish, bottom-dwelling invertebrates, land use practices in the watershed, weather, and physical setting and historical data are collected. Within the Central Wisconsin River Basin, there are several lakes monitored for long-term trends. Other lakes within the basin are monitored to meet resource-specific management needs.

The Self-Help Monitoring Program allows citizens to assist the DNR with basic lake data collection and take an active role in lake management activities. Self-help volunteers are trained by a WDNR lake management specialist to measure water clarity, and conduct other monitoring on some lakes. Volunteer monitors are active on several lakes within the Central Wisconsin River Basin.

Aquatic Plant Management Program

This program regulates the use of chemical treatments to abate nuisances caused by excessive aquatic plant growth. The objective of the permit procedure is to preserve the ecological benefits of lake plant communities, including fish and wildlife habitat, erosion prevention, and water quality maintenance. The program also promotes alternative methods of control and appreciation of the benefits of aquatic plants. Quantitative aquatic plant surveys provide information that is used for fish habitat improvement, protection of sensitive wildlife areas, aquatic plant management, and water resource regulations.

The Waterways and Wetlands Permit and Regulatory Program

Helps protect your water rights as well as public safety by ensuring adequate planning and design of projects affecting navigable public waters, shorelands and wetlands. Permit and plan approvals may be required for individual water projects. Site visits with landowners, in conjunction with local and federal administrators if appropriate, are arranged to learn site suitability for the proposed project, identify environmental impacts, and helping the landowner modify the proposal if needed. Striking a balance between landowner needs and desires, and protecting public resources is one of the greatest challenges to water regulation staff.

Want to know more about waterways and wetlands?
http://www.dnr.state.wi.us/org/water/fhp/
http://www.dnr.state.wi.us/org/water/fhp/waterway/index.htm
http://www.dnr.state.wi.us/org/water/wm/dsfm/

Department staff assist with a number of wetlands and shoreland management and protection programs

In cooperation with an array of state, federal and local agencies. In past decades, wetlands were often viewed as wastelands, useful only when drained or filled. In more

Want to know more about runoff management?
http://www.dnr.state.wi.us/org/water/wm/index.htm
http://www.epa.gov/owow/nps/index.html
http://www.cwp.org/

recent times, wetland benefits to people and the natural world have become widely recognized. They can store runoff waters and gradually release them to reduce flood peaks. Groundwater discharge, which commonly occurs from wetlands, can be important for stabilizing stream flows, especially during dry months. Wetlands can store or filter nutrients, such as phosphorus and nitrogen, providing water quality benefits. Wetland vegetation along a shoreline can hold soil particles and prevent shoreline erosion by reducing wave energy. They also provide food for a wide variety of organisms, including fish, amphibians, reptiles, birds and insects. Many wildlife species depend upon wetlands habitat for part or all of their life cycle, for breeding, resting, escape cover, nesting and travel corridors. In recognition of these benefits, staffs provide technical assistance to landowners and cooperating agencies for wetland restoration projects.

As part of the state's effort to protect wetlands, the legislature established the Wisconsin Wetland Inventory in 1978. The WDNR was directed to inventory Wisconsin's wetlands to obtain an accurate assessment of wetlands in the state. The initial inventory was completed in 1984.

Regulatory Programs

Department of Natural Resources staff assist with or manage a number of regulatory programs on the local, state and federal levels. Under Chapters 30 and 31 of Wisconsin Statutes, the Department reviews and processes permits for activities that involve physical alterations to surface waters. Examples include construction of dams and bridges, dredging of lake and riverbeds, reconstruction of boathouses, piers and fish cribs, stream realignments, rip-rap along shorelines and activities that change water level or flow.

The U.S. Army Corps of Engineers (COE) reviews and processes permit applications for projects located in navigable waters and wetlands under the Federal Clean Water Act. The state also approves projects in non-navigable wetlands, using a procedure called water quality certification. Water quality certification assures that water quality standards that have been established for public waters will not be violated.

State law requires counties, cities and villages to adopt and administer local regulations to control development along shorelands and in floodplains. The Department provides guidance for these programs. Activities such as flooding, draining, ditching, tiling, excavating, building and road construction are regulated in wetlands. Regulations in shoreland areas govern lot size, setbacks of buildings and structures from navigable waters, tree and shrub cutting, location and size of waste disposal systems, filling and the development of structures in floodplains.

Management Programs

The Department assists with wetlands and shoreland management and protection programs, in cooperation with an array of state, federal and local agencies. Farmlands adjacent to streams, lakes, ponds, sinkholes or wetlands that meet certain crop history requirements may be eligible under the Conservation Reserve Program (CRP) for cost sharing and rental payments to establish riparian buffers and filter strips.

The Wetlands Reserve Program (WRP) protects, restores and enhances wetlands and associated uplands through restoration cost-share agreements and easement acquisition. Eligible lands must be restorable and suitable for wildlife benefits, and may include wetlands cleared or drained for farming, lands adjacent to wetlands that contribute to wetland functions and values, drained wooded wetlands and habitat corridors that connect protected wetlands. The CRP and WRP programs are administered through the Consolidated Farm Services Agency (CFSA), with technical assistance from the county offices of the Natural Resources Conservation Service (NRCS) and the WDNR.

Other programs provide a variety of cost-share opportunities to restore habitat that can benefit wetlands, shoreland, and other land and water resources. Examples include the Stewardship Incentive Program (SIP), Forest Incentives Program (FIP), Wildlife Habitat Incentive Program (WHIP), and the Wisconsin Forest Landowner Grant Program (WFLGP). Many state and federal conservation agencies as well as public and private-sector partners cooperate in the administration of these programs.

Watershed Programs

Waterway and Water Safety Programs

Dam Safety Program

Want to know more about dams and floodplains?
http://www.dnr.state.wi.us/org/water/wm/dsfm/
http://www.ferc.fed.us/

Chapter 31 of Wisconsin's State Statutes was developed to ensure that dams are safely built, operated and maintained. In 1986, Administrative Code NR 333 was adopted to provide design and construction standards for large dams. The Water Management Engineer administers these programs in the Central Wisconsin River Basin. Responsibilities include dam inspections to assure dam safety, plan approval of proposed repairs and modifications, oversight of dam construction, operation and maintenance, as well as removal.

Since 1986, Chapter 31.19 requires the Department to inspect **all** large dams on navigable waterways once every 10 years. Staffing shortages has caused this aspect of the program to be 50% below its target.

Large dams are defined as having a structural height of over 6 feet and impounding more than 50 acre-feet or having a structural height of over 25 feet and impounding more than 15 acre-feet. Generally dams that are federally owned or regulated by a federal agency are not state inspected.

Hydropower Re-Licensing and Compliance Monitoring Program

Dams in the United States that are used for energy production or "hydropower" are regulated by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act. FERC is the primary regulatory agency responsible for issuing new licenses, monitoring compliance with existing licenses and conducting dam safety inspections on hydropower projects in the United States. Historically, hydropower licenses were primarily focused on maximizing hydropower generation. Over time, resource agencies and the general public became concerned that operating conditions under existing licenses were having adverse impacts on aquatic habitat and organisms and recreational use opportunities.

In 1986, Congress passed the Electric Consumers Protection Act (ECPA), requiring that the FERC consider power and non-power values and interests equally. As a result, FERC developed a detailed five-year consultation process between hydropower owners, resource agencies and the general public when existing facilities came up for re-licensing. Since then, the Department has been participating in licensing activities on all new and re-licensed projects.

Within the past few years many stakeholders have formed settlement groups to address the new regulatory requirements placed on hydropower operators and owners, resource agencies and the general public. This new settlement process is mainly directed at negotiating resolutions to licensing issues so that all affected parties concur with the terms and conditions of the new operational license.

Dam Grant Program

Since the advent of the Dam Safety Inspection Program in 1986, funding for dam repairs and modifications has been available to eligible communities through a Dam Grant Program. Communities facing repair or modification of their dam can apply for partial coverage of the costs. Eligible costs are limited to 50% of the total project including engineering costs, up to a maximum state contribution of $200,000. Some communities use this fund for removing their dam

Floodplain Zoning Program

The Wisconsin Water Resources Act of 1965 directed the WDNR to develop statewide minimum standards for shoreland and floodplain areas. The goals of the floodplain management program are to prevent flooding and flood-blighted areas, to minimize the costs of flood control projects, reduce tax dollars spent on flood relief, health and property. Counties, cities, and villages are required to administer floodplain-zoning regulations, to insure that development is protected from flooding. The Central Wisconsin River Basin has 45 counties, cities and villages that have identified floodplain areas.

Non Point Pollution Programs

The Department's Runoff Management Program

Protects Wisconsin's surface and groundwater resources from pollutants that are carried in runoff. Nonpoint source pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, or ground water. Runoff pollution also causes adverse changes to the vegetation, shape, and flow of streams and other aquatic systems. Agriculture, forestry, grazing, septic systems, recreational boating, urban runoff, construction, physical changes to stream channels, and habitat degradation are potential sources of pollution.

Nonpoint Source Water Quality Standards

The DNR has statutory authority relating to nonpoint sources that are agricultural. After consulting with DATCP, DNR must promulgate rules prescribing performance standards prohibitions for agricultural facilities and agricultural practices that are nonpoint sources. The performance standards and prohibitions shall be designed to achieve water quality standards by limiting nonpoint source water pollution. At a minimum, the prohibitions shall provide that livestock operations have no:

(1) overflow of manure storage structures;

(2) unconfined manure within a water quality management area;

(3) direct runoff from a feedlot or stored manure into waters of the state;

(4) unlimited accesses by livestock to waters of the state in a location where high concentrations of animals prevent the maintenance of adequate sod cover.

Nonpoint Source Water Pollution Abatement Programs

Urban and rural nonpoint source (NPS) pollution is Wisconsin's greatest cause of water quality problems, degrading or threatening about 40 percent of the streams, about 90 percent of the inland lakes, much of the Great Lakes harbors and coastal waters, and substantial groundwater and wetland areas. The effects of polluted runoff can be seen in the destruction of fish habitat, fish kills, reduction in drinking water quality, siltation of harbors and streams, and a decline in recreational use of lakes.

Nonpoint Sources of water pollution are those sources that are diffuse in nature, having no single, well-defined point or origin. Nonpoint sources include land management activities that contribute to runoff, seepage or percolation that adversely affect the quality of waters in the state, the DNR estimates that nearly one-half of the lakes and streams within assessed watersheds are degraded by NPS pollution, with an additional one-quarter considered threatened. Within these areas, NPS pollution is responsible for 90% of the observed degradation in lake water quality and 45% in stream water quality.

Both urban and rural land use activities are the source of NPS pollutants entering Central Wisconsin's lakes, streams, wetlands and groundwater. Common pollutants in runoff include the following:

- Sediment, pesticides and nutrients from both urban and rural sources;
- Oil, grease, heavy metals, and other toxic materials from impervious surfaces such as streets, highways, roof and parking lots;
- Farm animal wastes from barnyards and pet wastes from urban areas, and
- Sediment from construction sites.

Nonpoint Source Grants

The DNR provides cost-share grants to eligible landowners for the installation of pollution abatement projects within priority watershed project areas. DNR awards cost-sharing grants to counties for 50% or more of the costs of installing practices to abate nonpoint source pollution. These grants are included in the

unified grant award to counties. Counties, in turn, provide cost-sharing grants to individual landowners for cost-share agreements to install water pollution abatement practices and structures.

Wisconsin's Nonpoint Source Water Pollution Abatement Program

Provides grants to local governmental units, in watersheds selected for priority watershed projects. Grants can reimburse a portion of the cost of installing best management practices, which reduce the likelihood of pollutants being carried to streams, lakes or groundwater via runoff. Examples of agricultural best management practices (BMPs) include reduced tillage methods, nutrient and pesticide management, vegetated filter strips, streambank repair, and fencing to restrict cattle access. For existing urban areas best management practices may include development of construction site erosion control and stormwater management ordinances, and stormwater detention and infiltration facilities.

Want to know more about the Priority Watershed Program?
http://www.dnr.state.wi.us/org/water/wm/nps/npsprogram.html

The Priority Watershed (PWS) Program is a joint effort of the WDNR, Department of Agriculture, Trade and Consumer Protection (DATCP), the University of Wisconsin Extension (UWEX), counties (usually through their Land Conservation Departments), municipalities, and Lake Districts.

Point Source Pollution Abatement (WPDES Discharge Permit Program)

Industrial and Municipal Wastewater Program

The WDNR regulates municipalities and industrial facilities discharging wastewater to surface water or groundwater through the Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Program. Specific permits are written for industrial and municipal facilities. The permits limit the level of pollutants that can be in effluent discharges to surface and groundwater and direct the disposal of solids that can be generated from treating the wastewater. . Compliance schedules can be included in WPDES Discharge permits to require facilities to meet new limits and to report on the ability of the treatment plant to meet existing limits.

Want to know more about wastewater and stormwater?
http://www.dnr.state.wi.us/org/water/wm/ww/index.htm
http://www.dnr.state.wi.us/org/water/wm/glwsp/ssaplan/controls.htm

Upgrades and construction of new plants to meet new or existing limits need to be approved by the Department. Approval by the Department is a check to make sure that the treatment system will be adequate to remove the pollutants. In the case of municipalities the Department must also approve planning documents for the treatment systems to ensure that the plant is sized adequately for the current and future needs of the community. The planning documents include Facility Plans and in larger urban areas over 10,000 in population a sewer service area plan. This process of plan approval relies on a number of specialized engineers in the treatment process field that work for the Department.

Inspections to ensure compliance with the permits are also part of the WPDES Permit program. Inspections at treatment plants include reviews of the laboratory procedures that generate compliance data, record keeping, operation and maintenance records, effluent sampling, impacts on receiving waters, and facility site reviews.

Pretreatment Program

Certain industrial facilities called categorical industries that discharge to municipal treatment systems need to pretreat their waste before sending it down the sanitary sewer. Standards have been set for all dischargers of similar type. This prevents industries from moving to larger to municipalities where their waste could be diluted rather than treated. These industries are either regulated directly by the Department in the case of small treatment plants or indirectly by municipalities if the wastewater treatment plant is large (over 5 million gallons per day).

Biosolids or Sludge

Owners of treatment plants that generate sludges must follow appropriate sludge disposal methods. Some of the wastewater treatment facilities land applies their sludge as a disposal method. Every application site for sludge must be approved prior to use. Approval is based upon many criteria, including site characteristics, slopes, setback from surface waters, residences, wells and public areas, depth to high groundwater or bedrock and soil permeability. In addition, biosolids application cannot exceed the nutrient needs of the crop to be grown. To minimize the amount of phosphorus in biosolids that reaches surface waters, special attention is given to ensure that biosolids remains on land. Land application of (municipal generated) biosolids is prohibited on frozen or snow-covered land.

General Permits

There are also a number of general permits that are written for class type dischargers. Some these general permits include noncontact cooling water discharges, landspreading of food by-products, landspreading sludge and liquid wastes, pit trench de-watering, swimming pool discharges, nonmetallic mining discharges and stormwater permits for industrial facilities to name a few. These permits are for discharges that are less likely to impact the environment and require minimal oversight

Septage

Unlike biosolids, septage is either the solids or wastewater generated by private on-site wastewater systems and treatment. Septage can be processed through sewage treatment plants or is directly land applied on approved sites. Site approval is based on the same general criteria as that for municipal sludge.

Want to know more about waste disposal?
http://www.dnr.state.wi.us/org/gmu/groundwaterfiles/wastedis.html

Manure Management Program

DNR administrative rule NR 243 regulates all large feeding operations in the state and those smaller animal feeding operations that have been identified as causing a significant discharge of pollutants into state waters. The DNR is currently promulgating rules that will update NR 243.

Under NR 243, large concentrated animal feeding operations are required to obtain a Wisconsin pollutant discharge elimination system (WPDES) permit from the DNR. This is the same permit system used to regulated “point source” water pollution discharges, such as municipal sewage treatment plants. A large concentrated animal feeding operation is defined by rule as having greater than 1,000 standard animal units. One animal unit is defined as the equivalent of one beef animal weighing 1,000 pounds. Under this measure, a dairy cow is equivalent to 1.4 animal units and a laying chicken is equivalent to .01 animal units. Large concentrated animal feeding operations are required to maintain acceptable management practices and facility design standards to prevent ground or surface water pollution.

Wisconsin's Stormwater Program

Wisconsin's Stormwater Program seeks to reduce the water quality problems that come from rainfall and snowmelt runoff in many developed areas. Roof tops and pavements collect and channel stormwater, carrying it to rivers, streams and lakes. Urban stormwater can be laden with sediment, nutrients, bacteria, heavy metals and other toxic materials. Studies conducted in Madison, Milwaukee and Eau Claire documented levels of metals, suspended solids and nutrients in stormwater effluent that exceed some in-stream water quality standards. Stormwater flows quickly over hard surfaces, and can cause flooding, "flashy" high flows and the loss of "base" flow during dry periods.

Construction sites that expose more than five acres of soil are also required to obtain stormwater and construction site erosion control permits, to minimize the amount of runoff and sediment that leaves the site. Examples of construction sites that require a stormwater permit from the WDNR include subdivisions, parking lots and athletic fields that exceed five acres in size. The Department of Commerce handles stormwater permits for sites where public buildings are a part of the project.

The Drinking Water and Groundwater Program

Want to know more about drinking water and groundwater?
http://www.dnr.state.wi.us/org/water/dwg/

The Drinking and Groundwater Staff implements several state statutes and state administrative codes, many of which are mandated by the federal Safe Drinking Water Act (SDWA). The WDNR, DATCP, DOT and COM (Department of Commerce) share enforcement responsibilities for state groundwater standards.

Water Quality standards are federally mandated by the Safe Drinking Water Act (SDWA) which was enacted in 1978 amended in 1986, and again in 1996. All the municipal water systems in the basin are meeting the current water quality standards specified by the (SDWA). However, much of the water is treated by various means to meet these standards. The SDWA specifies two types of standards, primary and secondary. Primary standards are those which may cause health-related problems; secondary standards are related to aesthetic problems.

Private Water Supply

The WDNR regulates the construction of private water wells and pump installations, ranging from low capacity wells serving private homes and small businesses to high capacity wells for crop irrigation or serving large industries. Well drillers and pump installers are licensed, and WDNR field staffs perform inspections to insure that they comply with DNR codes. In most cases, qualified professionals do private well water testing. Well water complaints may be investigated by DNR if there is evidence to suggest health-threatening contamination. If contaminants exceed state drinking water standards, a health advisory letter to the well owner will recommend actions to obtain a safe source of drinking water. Contaminants may include pesticides, solvents, petroleum products and health threatening heavy metals such as arsenic. Wisconsin's *Well Compensation Grant Program* provides financial assistance to replace or treat private wells that exceed state or federal drinking water standards. There are certain homeowner eligibility requirements. In response to known areas of groundwater contamination, the DNR establishes "special well construction or advisory areas" to alert and advise land owners and well drillers that they need to take special precautions when drilling a well.

Public Water Supply

The DNR regulates the construction and operation of wells and water systems for municipalities, sanitary districts and smaller communities such as mobile home parks and residential subdivisions. The DNR inspects all water supply systems serving the public to ensure compliance with all regulations. These systems are sampled regularly for compliance with safe drinking water standards.

There are 31 municipal water supply systems within the Central Wisconsin River Basin. Of the 29 watersheds located within the Basin, only 18 contain municipal wells. The majority of the groundwater supply comes from sand and gravel aquifers in the basin. Some type of a well head protection plan has been developed for 45 percent of the municipal wells in the Basin.

Although much of the groundwater used by municipalities in the basin is of very good quality, it is also obvious that the shallow nature of the sand and gravel and fractured granite aquifers make them very susceptible to contamination from the surface. Sands, gravel and other soils have the ability to filter particulate and biological activity can reduce some other contaminants over time, but pollutants like gasoline, fuel oil, solvents, leachate, pesticides, herbicides and nitrates can all reach the groundwater and make it unsuitable for drinking. Therefore it is imperative that we all take the measures necessary to protect the groundwater resource.

Other Related Programs

Bureau of Endangered Resources

Want to know more about endangered resources?
http://www.dnr.state.wi.us/org/land/er/
http://www.dnr.state.wi.us/org/land/er/nhi/NHI_ims/onlinedb.htm

In the Appendix C and Appendix D is a summary of the Threatened or Endangered Species Found in the Central WI River Basin by County (App.C) and Watershed (App.D).
Endangered Resources staff provide the Central Wisconsin River Basin with expertise and advice on endangered resources in our region. They manage the Natural Heritage Inventory Program (NHI), which is used to determine the existence and location of native plant and animal communities and of Endangered or Threatened Species of Special Concern. The NHI helps identify and prioritize areas suitable for State Natural Area (SNA) designation, provides information needed for feasibility studies and master plans, and maintains the list of endangered and threatened species.

Species Recovery and Management Planning and Implementation are specifically required under the State Endangered Species Law. Examples include the Timber Wolf Management Plan and Timber Rattlesnake Management Plan. Endangered Resources staffs also collaborate with basin staff in planning and assessing projects and activities to determine effects on rare species or communities, and to assist in finding opportunities for integrated ecosystem management.

A permit for the incidental taking of an Endangered or Threatened species is required under the State Endangered Species Law. The Endangered Resources Program oversees the permit process, reviews applications and makes permit decisions.

The goals of the endangered resources program are:

- to protect and manage native plant and animal species, natural communities and other natural features;
- to enhance and restore populations and habitats of rare and endangered species; and
- to promote knowledge, appreciation and stewardship of Wisconsin's native species and ecosystems for present and future generations.

There are several State Natural Areas within the Central Wisconsin Basin. Natural areas are tracts of land or water harboring natural features which have escaped most human disturbance and which represent the diversity of Wisconsin's native landscape. In the Appendix C and D is a summary of the Threatened or Endangered Species Found in the Central WI River Basin by County (App.C) and Watershed (App.D). In most cases, little management is necessary except to protect them from human disturbance. For many sites in the Central Wisconsin Basin, invasive exotic species are a problem.

Invasive Species Program

Invasive plants have become recognized in recent years as a major threat to the integrity of natural areas. These species have the ability to invade natural systems and proliferate, often dominating sometimes eliminating the native species in a community. Invasive species can alter natural ecological processes by reducing the interactions of many species to the interactions of only a few species. Introduced species may compete directly with native species for nutrients, sunlight, and space, and indirectly by altering the food web or physical environment. Invasive species may also prey on or cross with natives. Native species with limited population size or ecological range are particularly susceptible to displacement by aggressive exotic or translocated species.

Aquatic exotics have become a major threat to the integrity of natural waterways throughout Wisconsin. A key example of this in our basin is the rusty crayfish (*Orconectes rusticus*) eating all the vegetation in a given waterbody that they reside in. "According to a 1996 report by the Nature Conservancy, exotic species have contributed to the population decline of 42 percent of threatened and endangered species in the United States (WDNR Web, 01).

In the Central Wisconsin Basin focus is placed towards seven exotic species that either affect our basin or are of major concern for the overall integrity of our waterways. The species that will be focused on are Rusty crayfish (Orconectes rusticus), Eurasian water milfoil (*Myriophyllum spicatum*), Purple loosestrife (*Lythrum salicaria*), Curly-leaf pondweed (Potamogeton crispus), Zebra mussel (Dreissenia polymorpha), Reed Canary Grass (*Phalaris arundinacea*), Common Carp (*Cyprinus carpio*). Each exotic will be described on its method of spreading, why it is a problem or could be a problem, solutions and prevention measures that can be taken or are being taken to stop the exotic from becoming a wide spread nuisance.

Exotics not only aquatic but terrestrials are affecting our basin and it is becoming a growing concern. Nonnative species are taking over our area at an alarming rate and prevention and control is going to play a major part in stopping the wide spread of exotics. The department has created an Aquatic Nuisance Species Program, along with a Comprehensive State Management Plan (still in draft form) that is keep track of and studying the presence of exotic species. In the future, our basin will be keeping better track of what species aquatic and terrestrial are taking over and becoming a nuisance. This will be done through intensive monitoring and testing of our basin waters.

- Rusty crayfish (*Orconectes rusticus*)

Rustys are native to streams in the Ohio, Kentucky and Tennessee region. Spread by anglers, who use them as bait, rusty crayfish can severely reduce lake and stream vegetation, depriving native fish of cover and food. They can also drastically reduce native crayfish populations.

Rustys are found in the Wisconsin River and most tributaries attached to the Wisconsin River. They are also found in several isolated lakes and wetlands throughout the basin. Most of the aquatic species that were introduced to the Central Wisconsin Basin were either by connected waterways or spread to isolated lakes by fishermen. No solutions have been introduced to help stop or reduce the spreading of Rusty populations with out severally hurting the native species of that particular treated water body. The main concern is to stop the spread of the Rusty by educating the people, encouraging them to drain their live wells and not transporting live bait from one lake to another.

- Eurasian water milfoil (*Myriophyllum spicatum)*

Eurasian water milfoil was introduced to North America from Europe. It has spread westward into inland lakes primarily by boats and also by waterbirds, it reached Midwestern states between the 1950s and 1980s. In nutrient-rich lakes it can form a thick underwater stand of tangled stems and vast mats of vegetation at the water's surface. In shallow areas the plant can interfere with water recreation. The plant's floating canopy can also crowd out important native water plants.

A key factor in the plant's success is its ability to reproduce through stem fragmentation and underground runners. A single segment of stem and leaves can take root and form a new colony. Fragments clinging to boats and trailers can spread the plant from lake to lake. The mechanical clearing of weed beds for beaches, docks, and landings creates thousands of new stem fragments. Removing native vegetation creates perfect habitat for invading Eurasian watermilfoil. One advantage of a healthy native population of vegetation is Eurasian watermilfoil has difficulty becoming established in lakes with healthy populations of native plants.

- Purple loosestrife (*Lythrum salicaria*)

Purple Loosestrife is a wetland plant from Europe and Asia. It was introduced into the East Coast of North America in the 1800s. First spreading along roads, canals and drainage ditches, then later distributed as an ornamental, it is now located in 40 states and all Canadian border provinces.

The plant can form dense, impenetrable stands that are unsuitable as cover, food or nesting sites for a wide range of native wetland animals, including ducks, geese, rails, bitterns, muskrats, frogs, toads and turtles. Many rare and endangered wetland plants and animals are at risk of being forced out of their natural habatit.

Purple loosestrife thrives on disturbed, moist soils, often invading after construction activity. Eradication of an established stand is difficult because of an enormous seed bank that is stored in the soil. One adult can disperse two million seeds annually. The plant is able to regenerate from roots and broken stems that fall to the ground or into the water. A major reason for purple loosestrife's expansion is a lack of effective predators in North America. Several European insects that only attack purple loosestrife are being tested as a possible long-term biological control in North America.

- Curly-leaf pondweed (*Potamogeton crispus*)

Curly-leaf pondweed is a plant that forms surface mats that interfere with aquatic recreation. The plant usually drops to the lake bottom by early July. Curly-leaf pondweed was the most severe nuisance aquatic plant in the Midwest until Eurasian watermilfoil appeared. It was accidentally introduced along with the common carp. It has been here so long, most people are not aware it is an exotic.

- Zebra Mussel (*Dreissenia polymorpha*)

Zebra mussels are small, fingernail-sized mussels native to the Caspian Sea region of Asia. Transoceanic vessels transported them to the Great Lakes. Empty ocean going vessels would take on fresh water from European ports, then discharged the water into Lake St. Clair, near Detroit, where the mussel was discovered in 1988. Since that time, they have spread rapidly to all of the Great Lakes and waterways in many states, as well as Ontario and Quebec.
Diving ducks and freshwater drum eat zebra mussels, but not enough to control their rapidly going population. Means of spreading to inland lakes are not exactly known. Though microscopic larvae may be carried in livewells or bilgewater, where adults can attach to boats or boating equipment that remain in the water for extended periods of time

- Reed Canary Grass (*Phalaris arundinacea*)

Reed Canary, a coarse grass that grows 2 to 6 feet tall, sprouting single flowers which occur in dense clusters in May to mid-June or August, seeds are shiny brown. Reed canary grass is a coarse, sod-forming, cool-season, perennial grass, native to temperate regions of Europe, Asia, and N. America, and adapted to much of the northern half of U.S. The Mediterranean region is the center of diversity for this genus. Its best growth is in and around wetlands, including marshes, wet prairies, wet meadows, fens, stream banks, and swales. It has also been planted widely through out Wisconsin for forage and for erosion control.

Reproduction occurs from seeds and vegetatively by stouts (creeping rhizomes). It starts growing in early spring. Growth peaks in mid-June and declines in mid-August. Seeds ripen in late June and fall off when ripe. The native reed canary grass is not thought to be aggressive, as is the Eurasian ecotype. The major concern is to marshes and natural wetlands because of its aggressive nature, and rapid growth. Native wetland and wet prairie plant species are being replaced after several years by reed canary grass. It is of particular concern because of the difficulty of selective control. There are several treatments to remove Reed Canary Grass but all of them involve several years of treatment and intensive work.

- Common Carp (*Cyprinus carpio)*

Common carp are domesticated ancestors of a wild carp native to the Caspian Sea region and East Asia. Carp degrade shallow lakes by causing excessive turgidity, which can lead to declines in waterfowl and important native fish species. The common carp was introduced by unintentional and intentional release in 1879 and now is located throughout most of the United States. State owned fish hatcheries stocked carp almost statewide in early 1900's

Carp have become a major factor in our basins largest water bodies, carp dominant the biomass of fish in the Petenwell and Castle Rock flowages. The carp dominate the game fish by destroying aquatic vegetation, muddying the water and recycling phosphorus, all of which contribute to the algae blooms common during summer months.

In the Petenwell Flowage, carp are contaminated with PCBs and dioxin and exceed FDA rules for human consumption. They are currently listed on the annual DNR Fish Consumption Advisory as in group 3 "do not eat" category. The contamination problem makes carp control programs more difficult to get established. We cannot allow commercial fishermen to net them so as to prevent their entering food markets and it makes disposal more difficult because it could move the persistent contaminants to new location.

A DNR population estimate of carp conducted in 1994 on the Petenwell determined there were 1,070,857 carp, (95% confidence limits of 130,680) in the flowage. The total poundage was determined to be 5,225,782 pounds or 226 pounds per acre. In June of 1993 the DNR conducted a cove rotenone treatment project and determined there were 399lbs of carp present in a backwater cove considered to be preferred habitat for carp during that time of year.

Realistically, we have not discovered any new ways to eliminate the carp from a body of water as large as these flowages. Current management relies upon boosting the predator populations so as to offer perdition on the small carp after spawning in hopes of reducing their numbers.